

REMARKSAmendments and Support

By the above amendment, the claims in the case are 2-12 and 14-133. Claim 132 replaces Claim 1 and corresponds exactly to Claim 13 as previously amended except that ", or substantially concurrently," has been added after "which process comprises concurrently". Support for this addition is found in Claim 1 as originally filed which read in part "which process comprises concurrently, or substantially concurrently, feeding".

Claim 2 has been amended to add the description of the halogenating agent as being bromine, bromine chloride, or bromine and chlorine. Support for such addition appears in the Specification at Page 12, line 26 through Page 13, line 11.

Claim 13 has been replaced by Claim 133 which specifies the particularly preferred temperature range set forth in the Specification at Page 27, lines 12-14.

The other amendments in the claims likewise add no new matter. Instead they clarify the claims by replacing original references to components designated as (a), (b), (c), and (d) by the definition of the component itself so that there is proper antecedent basis for the terminology used. Also in Claim 28 "(a)" and "(b)" have been replaced by "(1)" and "(2)" respectively for purposes of clarification. In addition, the dependencies of the claims have been appropriately changed in view of the replacement of original Claim 1 which as noted above is in essence a repeat of original Claim 13.

Rejection Under 35 USC 112, Second Paragraph

In the Final Rejection the claims were rejected under 35 USC 112 second paragraph as allegedly indefinite for two reasons. First the Examiner objected to the use of the term "and/or". We submit that this term is perfectly clear since it is defined in common dictionaries. Enclosed and marked for identification as Elnagar Exhibit A is a copy of page 77 from *Random House Webster's Unabridged Dictionary*, Second Edition, Random House,

New York, copyright 2001, 1998, 1997, 1996, 1993, 1986. Also enclosed and marked for identification as Elnagar Exhibit B is a copy of page 106 of *Webster's II New Riverside University Dictionary*, The Riverside Publishing Company, copyright 1984, 1988, 1994, by Houghton Mifflin Company. It will be seen that both of these dictionaries provide a clear definition for the term "and/or". Accordingly there is not seen to be any basis in support of the contention that the term is "indefinite". Furthermore, a recent search of the USPTO full text and image database (a copy of which search is appended and marked for identification as Elnagar Exhibit C shows that there are at least 85,724 U.S. Patents in which the term "and/or" appears in the claims. Clearly therefore a great many Examiners have found the term "and/or" perfectly acceptable. Applicants have no objection to rephrasing the claims to recite, in effect, "A or B, or both of A and B" but since the claims in which "and/or" is used necessarily contain many words, it is felt that the use of "and/or" is desirable from the standpoint succinctness and clarity. But if the Patent Office insists, Applicants would be willing to further amend the claims even though this in our opinion would render the claims less clear simply because of the added words. Accordingly, reconsideration and withdrawal of the rejection under 35 USC 112, second paragraph, because of the use "and/or" is respectfully requested.

The other basis for the 112 rejection of alleged indefiniteness is the contention that "the claims should recite the oxidizing agent and any necessary reaction conditions". This contention is deemed insupportable as a matter of law. The term "oxidizing" appears only in Claim 124 in connection with the phrase "oxidizing coproduct inorganic bromide salt in said solution to form elemental bromine". And the term "is oxidized" appears only in Claims 130 and 131. In Claim 130 it appears in the phrase "wherein co-product bromide salt in said solution is oxidized to form elemental bromine". In Claim 131, the phrase reads "wherein the inorganic bromide salt in the aqueous solution remaining after said precipitate has been removed therefrom is oxidized to form elemental bromine". All of these phrases not only say what is to be oxidized, but further specify what is to be formed by the oxidation. Anyone of ordinary skill in the art knows that such oxidation can be successfully carried out in any of a

variety of methods such as by use of chlorine or other chlorine sources such as hypochlorite or other oxidizing agents such as peroxides and the like. Furthermore, the rejection focuses only on "oxidizing" or "is oxidized" and ignores the further limitations as to what product is to be formed, and therefore also ignores what one of ordinary skill in the art already knows can be used and how it can be used. Because the rejection ignores the existence of the pertinent additional limitation in the claims, viz., that the oxidation is "to form elemental bromine", the rejection is submitted to be improper. As held in *In re Geerdes* 491 F.2d 1260, 180 USPQ 789 (CCPA 1974):

However, every limitation in the claim must be given effect rather than considering one in isolation from the others. *In re Wilder*, 57 CCPA 1314, 429 F.2d 447, 166 USPQ 545 (1970).

Moreover, *In re Angstadt et al.*, 537 F.2d 498, 190 USPQ 214 (CCPA 1976) is directly in point on both the facts and the law:

We note at the outset that the claim limitation "to form * * * hydroperoxides" must be given effect since we must give effect to all claim limitations. See *In re Geerdes* 491 F.2d 1260, 180 USPQ 789 (Cust. & Pat. App. 1974); *In re Wilder*, 429 F.2d 447, 57 CCPA 1314, 166 USPQ 545 (1970).

Consequently, the rejection under 35 U.S.C. 112, second paragraph, is deemed erroneous and without foundation in fact or law.

Rejection Under 35 USC 103(a)

The claims have been rejected under 35 U.S.C. 103(a) on Rogers I (2,392,505), or Rogers II (2,398,598), or Paterson I (2,779,764), or Paterson III (3,147,259), or Wolf et al. (2,920,997), or Waugh et al III (3,121,715), or Cole (4,532,330), or Girard et al I (4,560,766), or Girard et al II (4,654,424), or Puzig (4,677,130), or Lee et al (4,745,189) or Bhattacharya (WO 97-43264) or Jolles, *Bromine and its Compounds*, 1966, Ernest Benn, London, page 365). None of these 13 references even hints at, muchless makes obvious, a process in which *all* of the necessary components for the halogenation reaction are fed concurrently or

substantially concurrently as at least two separate feeds, so that during all or substantially all the time such feeding is taking place, (a) the pH is maintained within specified limits and (b) the desired product is precipitating from the reaction mixture. Instead, what these references teach is as follows:

A) Rogers I expressly teaches at Page 1, Column 2, lines 6-12:

In accordance with the present invention, a disubstituted hydantoin is reacted with chlorine or other halogen *in* an aqueous medium while maintaining the reaction mixture in an alkaline condition and stopping the reaction ***when the theoretical amount of the halogen required to form the monochlorohydantoin has reacted.***

(Emphasis supplied)

Not only is the reaction conducted *in* the aqueous medium, but in addition it is not feasible to stop the reaction in the manner specified by Rogers I if the reagents were concurrently being fed. Thus in reality Rogers I leads away from the presently-claimed subject matter. We see nothing elsewhere in Rogers I that supports a contrary position. For example, while Rogers I states at Page 1, Column 2, lines 29-31 that a small amount of alkali may be present initially, and further amounts may be added during the course of the reaction, this is not suggestive of adding **all** of the components concurrently or substantially concurrently in the manner specified in the present claims.

B) Rogers II expressly teaches at Page 1, Column 2, lines 4-16:

In preparing the 1,3-dichloro-5-methyl-5-isobutyl hydantoin desired, the 5-methyl-5-isobutyl hydantoin is dissolved in an aqueous alkaline solution. * * *

Gaseous chlorine may now be passed into the aqueous alkaline solution containing the dissolved hydantoin.

Clearly there is no way by which a suggestion of concurrent feeding or substantially concurrent feeding of all required components as specified in Applicants' claims can be derived from this teaching. And we see nothing elsewhere in Rogers II that supports a contrary position.

- C) Paterson I expressly teaches at Column 2, lines 3-8:

In one method of practicing the present invention, a 5-substituted hydantoin is mixed with water containing known amounts of an alkalizing agent such as sodium hydroxide, sodium carbonate, sodium bicarbonate, or the like, and bromine is added to the mixture . . .

No other method is described in Paterson I, and clearly the method that is disclosed in Paterson I is not suggestive of the presently-claimed subject matter. We see nothing elsewhere in Paterson I that supports a contrary position.

- D) Paterson III expressly teaches at Column 3, lines 19-26:

It has been found that the bromination of the present process proceeds in a manner which can be best described by consideration of the theoretical sequences involved. When the N-hydrogen carrier precursor is placed in the aqueous alkaline medium and treated with the requisite amount of bromine . . .

Here again there is nothing to suggest concurrent or substantially concurrent feeds of all the required components in the manner called for in the present claims. And we see nothing elsewhere in Paterson III that supports a contrary position. Thus while this reference says at Column 3, lines 40-43 that there is no need to preserve any sequence, it is clear that the sequence referred to relates to the feeds of bromine and chlorine as is shown by the rest of the sentence which says that the reactions may be carried out simultaneously by introducing chlorine at the same time the bromine producer is added.

- E) Wolf is still another deficient reference. In each of its Examples I-V, chlorine gas is passed into a solution or slurry containing the other components. Thus there is no way of finding the presently-claimed subject matter obvious in view of Wolf. We see nothing elsewhere in Wolf that supports a contrary position.

- F) Waugh III points out at Column 2, lines 1-6:

In accordance with the present invention, an N-brominated organic compound is produced by reacting bromine with one of the above N-hydrogen organic compounds in an alkaline or basic solution,

and in the presence of a chloro agent, *i.e.*, either chlorine or the corresponding N-chloro organic compound.

Once again there is no suggestion here to concurrently or substantially concurrently feed all of the required components in the manner specified by the present claims. And we see nothing elsewhere in Waugh III that would support a contrary position.

G) Cole describes his halogenation process at Column 2, lines 47-57 as follows:

These materials are prepared by the reaction of dimethylhydantoin, and the corresponding source of halogen in water. The halogenation step is carried out in the presence of base to neutralize the acid formed in the halogenation step. * * * The inorganic source of -OH and the halogenating agent are added concurrently at such a rate that the pH is maintained in the range of about 6.8-7.0 . . .

It is clear from this description that the halogenating agent and the base are concurrently added to the dimethylhydantoin, and thus there is no suggestion of concurrently or substantially concurrently feeding all of the required components in the manner of Applicants' claims. We see nothing elsewhere in Cole that would support a contrary position.

H) Girard et al. I is still another deficient reference. Thus in Example Three the product was formed by dissolving methylethylhydantoin in water and adding chlorine gas to the mixture. pH control was maintained by periodic addition of sodium hydroxide solution. In Example Six the product was prepared in the same manner as in Example Three. And in Example Seven the product was prepared by charging the hydantoin, sodium bromide and distilled water to a flask and then feeding chlorine at a controlled pH using a solution of sodium hydroxide. None of these procedures of Girard et al. I is suggestive of concurrently or substantially concurrently feeding all of the required components in the manner specified in the present claims. We see nothing elsewhere in Girard et al. I that would support a contrary position.

I) Girard et al. II is indicated to be a division of Girard et al. I and a cursory inspection indicates that the disclosures appear to be the same.

- J) Puzig describes in Example 1 the synthesis of 1-bromo-3-chloro-5,5-dimethylhydantoin by initially charging water, followed by dimethylhydantoin, to a reactor. Next, bromine and an aqueous solution of sodium hydroxide and then chlorine and an aqueous solution of sodium hydroxide were added with pH being controlled at 6.8-7.0. As in the case of each of the above references, there is no suggestion of concurrently or substantially concurrently feeding all of the required components in the manner specified in the present claims. We see nothing elsewhere in Puzig to support a contrary position.
- K) The process disclosed in Lee et al. as exemplified in Example I involves charging sodium hydroxide, water, 5,5-dimethylhydantoin, and dichloromethane into a flask. Then, bromine was fed into the reactor. Next, chlorine was fed into the reactor. Examples II and III of Lee et al. used the same procedures as in Example I. The procedure in Example IV of Lee et al. is along the same lines as that of Example I. Thus, there is no suggestion in Lee et al. of the presently claimed subject matter.
- L) Bhattacharya provides a description in Example 7 of the production of 1,3-bromochloro-5-methyl-5-propylhydantoin. The process involved adding 5-methyl-5-propylhydantoin and water to the reaction flask. To this suspension were added bromine and aqueous sodium hydroxide solution simultaneously at a pH of about 7. Once again, there is no suggestion here of concurrently or substantially concurrently feeding all of the required components in the manner specified in the present claims. And we see nothing in Bhattacharya that would support a contrary position.
- M) Jolles describes two complete bromination procedures. In addition the beginning of another bromination is referred to at the bottom of the page. In the case of producing N-bromosuccinimide, succinimide is mixed with crushed ice and a solution of potassium hydroxide in water. Bromine is then slowly added to this mixture. The next preparation is of 1,3-dibromo-5,5-dimethylhydantoin. In this case, 5,5-dimethylhydantoin and sodium carbonate are dissolved in cold water. Thereafter bromine is added at a rate to keep the temperature below 25°C. The fragmentary description of producing N-bromophthalimide involves forming a solution of sodium

hydroxide in water, adding phthalimide to the solution and then adding bromine while maintaining temperature control. Clearly none of these process descriptions is suggestive of the subject matter of the present claims.

From the above, it is clear that not one of these various references can legitimately be said to render obvious the subject matter of Applicants' claims. In this connection, we wish to respectively point out that the conclusion in the prior Office Actions that it would be obvious to N-halogenate compounds having a halogenatable amido or imido nitrogen by the method of the references is based on an erroneous premise. The presently claimed process does not involve the method of any of the references as is made manifestly clear hereinabove. The present claims define an entirely new process. In fact, the Action itself recognizes this inasmuch as the prior art rejection is based on Section 103 rather than Section 102. The remainder of the conclusion on page 3 of the Action suggests that "optimum conditions" are here involved. However, this is not so, either. Since Applicants' claims are directed to completely novel and unobvious subject matter, no prior art process is being optimized. Instead, new, highly beneficial process technology is claimed in the present application.

Furthermore, it is manifestly clear that the rejection has not taken into consideration even the most fundamental distinguishing aspect of the claimed invention, namely the fact that the claims all call for concurrently or substantially concurrently feeding to a reaction zone the specified components so they come together in the reaction zone such that in the resulting reaction, the product precipitates and the pH is continuously or substantially continuously maintained in a specified range. In such a process there are at least two separate feeds taking place at about the same time. During substantially the entire time these feeds are being conducted, the components being fed come together in the reaction zone in the proper proportions, reaction takes place to form the N-halogenated product, this product continuously or substantially continuously precipitates from the liquid phase of the reaction mixture, and the pH of the reaction mixture is kept continuously or substantially continuously within a controlled specified range, thereby contributing to the maintenance of uniform conditions

during the reaction. This results in a number of advantages spelled out and shown by results in the Specification.

For example, the Specification at Page 29, line 17 through Page 31, line 2 describes a number of unexpected advantageous features and results of the invention as follows:

From the foregoing it can be seen that this invention involves an interrelationship among controllable reaction variables which result in the production of high quality products in high yield in rapid reactions. Thus, this invention features, *inter alia*, concurrent feeds of the reaction components with specified control of pH by means of feed rates. In preferred embodiments, adjustment and control of temperature enables rapid formation of product in high yield and with large particle size. Also, utilization of reaction mixtures in highly diluted conditions contributes materially, in preferred embodiments, to high yields and allows greater flexibility in operating temperatures. Moreover, the rapid precipitate formation under steady-state conditions makes possible the use of short residence times in continuous operations, and thus contributes materially to improved plant throughput.

As can be readily seen from the Examples hereinafter, this invention makes possible the provision of 1,3-dihalo-5,5-dimethylhydantoins with large average particle sizes. For example, by use of this invention it is now possible to produce 1,3-dibromo-5,5-dimethylhydantoin particulate solids having an average particle size of at least about 175 microns. In fact, 1,3-dibromo-5,5-dimethylhydantoin particulate solids having an average particle sizes of greater than 200, 300, and even as much as over 500 microns have been obtained by use of the present process technology. So far as is known, despite the ability to produce some hydantoin compounds comprised of large particles, 1,3-dibromo-5,5-dimethylhydantoin with an average particle size of 175 microns or greater has not been produced heretofore. Moreover, the 1,3-dihalo-5,5-dimethylhydantoins produced by processes of this invention are devoid of traces of organohalide solvent residues inasmuch as these products are formed in the absence of any halogenated organic solvent such as methylene chloride.

Because this invention enables the direct production of 1,3-dibromo-5,5-dimethylhydantoin reaction products in which the recovered 1,3-dibromo-5,5-dimethylhydantoin particulate solids have an average particle size of at least 175 microns, several very substantial advances in the art are made possible. For example, it has been discovered that 1,3-dibromo-5,5-dimethylhydantoin particulate solids having average particle sizes above 175 microns:

- a) are far easier to handle because of their much lower dusting tendencies;
- b) have flow properties through pipes and conduits and from hoppers that are far superior;
- c) could be pressure compacted into shape-retentive tablets without use of a binder and without breakage occurring, whereas samples of commercially-available 1,3-dibromo-5,5-dimethylhydantoin particulate solids from several different sources could not be converted into tablets in the same manner without breakage occurring.

These and related discoveries are described in detail in commonly-owned copending Application No. 09/484,687 referred to above.

It is clear from the record that the "feeding" aspects and beneficial results resulting from the claimed subject matter have been ignored in the two prior Office Actions. Thus in the first Office Action mailed June 20, 2001, the 103 Rejection is explained in the following manner:

The references disclose the N-halogenation of compounds having at least one N-halogenatable amide or imido nitrogen by reacting such a compound with a halogenating agent in the presence of an inorganic base and water. Please note for example [citation of portions of the references omitted] it would be obvious to N-halogenate compounds having a halogenatable amide or imido nitrogen by the method of the references and determining the optimum conditions for reaction absent any showing of any unobvious or unexpected results since only the expected products are obtained.

Note the complete absence of any reference whatsoever to the limitations in the present claims as regards how the materials are fed and the beneficial consequences of such feeding such as the precipitating of the product and the maintaining of the specified pH ranges during the feeding. All that is considered in the rejection is "N-halogenation" and "expected products

are obtained". In fact, even these observations in the rejection completely miss the point of the invention since the action implies that the present claims are using "the method of the references" which is erroneous. The present claims do not use the method of the references since the references call for sequential feeding whereas the present claims call for concurrent or substantially concurrent feeding of at least two feeds. Moreover, it is clear that the beneficial results of the present process have been completely ignored, since the Action indicates that "only the expected products are obtained". This again shows that the Specification has been ignored since in the Specification it is made clear and shown that the particle size of the products produced by such cofeeding can be much larger than producible by prior art methods, even including commercially practiced methods.

In the ensuing Final Rejection, these same limitations and results have again been completely ignored. Thus the essential portion of the Final Rejection states:

Applicants' arguments have been carefully considered but are not persuasive. The references just like the claimed process are drawn to the N-halogenation compounds having at least one N-halogenatable amido or imido nitrogen by reacting such compound with a halogenating agent in the presence of an inorganic base and water within the pH range recited in the claims. No showing of any unobvious or unexpected results have been forth coming.

Here again, the Office Action pays no attention whatever to the "cofeeding" aspect of the invention and completely ignores the results given in the Specification as regards the beneficial effects of conducting the process in the novel process set forth in the present claims. All that is focused on is "N-halogenation" and use of "an inorganic base and water within the pH range recited in the claims".

We respectfully submit that by ignoring even the most fundamental sharp distinction over the cited prior art, the Rejection is erroneous as a matter of law. It is well settled that every limitation positively recited in the claims must be given effect when considering the

patentability of such claim. Indeed, it is error to ignore specific limitations distinguishing over the references. See for example *In re Glass*, 472 F.2d 1388, 176 USPQ 489 (CCPA 1973); *Ex parte Conner*, 215 USPQ 384 (Bd App & Infrf 1979); *Ex parte Wolters et al.*, 214 USPQ 735 (Bd App & Infrf 1979); *Ex parte Bonutti*, 2000 WL 33347628 (Bd. Pat. App & Infrf. 2000). The impropriety of ignoring a claim limitation is well stated in *Ex parte Bonutti* as follows:

Consequently, in applying the prior art, the examiner appears to have disregarded the cement bodies as recited in the claims, but such an approach is incorrect, for as stated in *In re Glass*, 472 F.2d 1388, 176 USPQ 489 (CCPA 1973), "[i]t is error to ignore specific limitations distinguishing over the references."

Moreover, many other patentably distinguishing limitations appear in Applicants' claims. Some of these additional patentable distinctions over the prior art are as follows:

- A) A cofeeding process in which the reaction is started in the presence of a heel from a prior reaction is found in Claims 5, 57, 73, and 74.
- B) A cofeeding process in which the feeds are fed subsurface to the liquid phase of the reaction mixture is found in Claims 15, 60, 76 (in-part), 88, 89, 97, 98, 106, 114, 115, 117, 118, 123 (in-part), and 127.
- C) A cofeeding process in which the feeds are fed to a mixing device which produces an effluent stream which is fed into the reaction vessel is found in Claims 6, 7, and 8.
- D) A cofeeding process in which the feeds are fed to a static mixer which produces an effluent stream which is fed subsurface to the liquid phase in the reaction vessel is found in Claim 7.
- E) A cofeeding process in which the feeds are fed to a jet mixer which produces an effluent stream which is fed subsurface to the liquid phase in the reaction vessel is found in Claim 8.
- F) A cofeeding process which is conducted in a continuous mode in which, under steady-state conditions, the ratio of the volume of the reaction mixture in liters to the moles of the amido or imido nitrogen compound being fed is in the range of about 10 to

about 100 liters per mole per minute or in the range of about 30 to about 60 liters per mole per minute is found in Claims 11, 19, 31, 32, 35, 37, 39, 41, and 54.

- G) A cofeeding process which is conducted in a batch mode in at least one reactor and wherein, until the volume of the reaction mixture reaches 50% of the total volume thereof, the feeds to the reaction mixture are maintained such that the ratio of the volume of the reaction mixture in liters to the moles of the amido or imido nitrogen compound being fed is in the range of about 10 to about 100 liters per mole per minute or in the range of about 20 to about 80 liters per mole per minute; and wherein when the volume of the reaction mixture is 50% or more of the total volume of the reactor, the feeds are maintained such that the foregoing ratio is in the range of about 30 to about 60 liters per mole per minute is found in Claims 12, 20, 33, 34, and 53.
- H) A cofeeding process in which the cofeeds are proportioned such that there are defined molar ratios of inorganic base having a monovalent cation to halogenatable amido or imido nitrogen atoms, per liter of water and defined molar ratios of inorganic base having a divalent cation to halogenatable amido or imido nitrogen atoms, per liter of water, is found in Claims 23, 24, 51, 52, 66, 67, 68, 69, 76 (in-part), 84, 85, 93, 94, 96, 97, 98, 104, 105, 113, 114, 115, 116, 117, 118, 122 (in-part), and 123 (in-part).
- I) A cofeeding process which is conducted in a continuous mode in which the precipitate being continuously formed has a purity of at least about 97% and is formed in a continuous or substantially continuous yield of at least about 85% based on the amount of the amido or imido nitrogen compound being fed is found in Claim 28.
- J) A cofeeding process in which bromine is fed as a mixture of bromine vapor and at least one inert gas is found in Claims 89, 95, 98, 109, and 115.

It clearly appears that none of these additional distinguishing features have been taken into consideration in the formulation of the 103 rejection.

Inasmuch as various patentable limitations and features of the invention have not been taken into consideration as required by such decisions as *In re Geerdes*, *In re Angstadt et al.*,

In re Glass, Ex parte Conner, Ex parte Wolters et al., and Ex parte Bonutti, all referred to above, it necessarily follows therefore that a *prima facie* case of obviousness does not and cannot exist since the Rejection has not taken into consideration either the limitations set forth in the claims which sharply distinguish over the prior art or the unexpected beneficial results which result from such limitations. As held *In re Fritch*, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992);

In proceedings before the Patent and Trademark Office, the Examiner bears the burden of establishing a *prima facie* case of obviousness based upon the prior art.

And as stated in *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992):

If the examination at the initial stage does not produce a *prima facie* case of unpatentability, then without more the applicant is entitled to grant of the patent.

Obviously a *prima facie* case cannot be established when essential features of the claimed invention and the results achieved thereby have been disregarded in rendering the rejection.

Since there is no *prima facie* case of obviousness, there is no need whatever for a showing of unexpected or unobvious results. But the fact of the matter is that a reading of the Specification will show beyond peradventure that unobvious beneficial results are achievable by practice of the claimed invention.

The present Application shows in its Examples that Applicants' process enables production of much larger particle-sized product than when the same product is produced by the prior art commercial technology. This result could not have been foreseen prior to this invention, and is thus an unobvious advantageous result. Indeed, it is counter-intuitive since the claimed cofeeding process results in the prompt precipitation from solution of the reaction product as the feeds are taking place. One might guess therefore that the particle size would be small. Yet as shown in the Examples and Table 6, the presently-claimed process enables

production of products having much larger particle sizes, much larger even than the corresponding commercially-produced product.

Also Applicants' Table 8 shows that the presently-claimed process technology enables formation of brominated products having significantly lower yellowness index values than corresponding commercially-produced products obtained from three different chemical suppliers. None of the 13 applied references suggests a that the manner in which reactants are fed could have a beneficial effect upon the color characteristics of the product, muchless suggest a process in which the feeding enables reduction in product coloration.

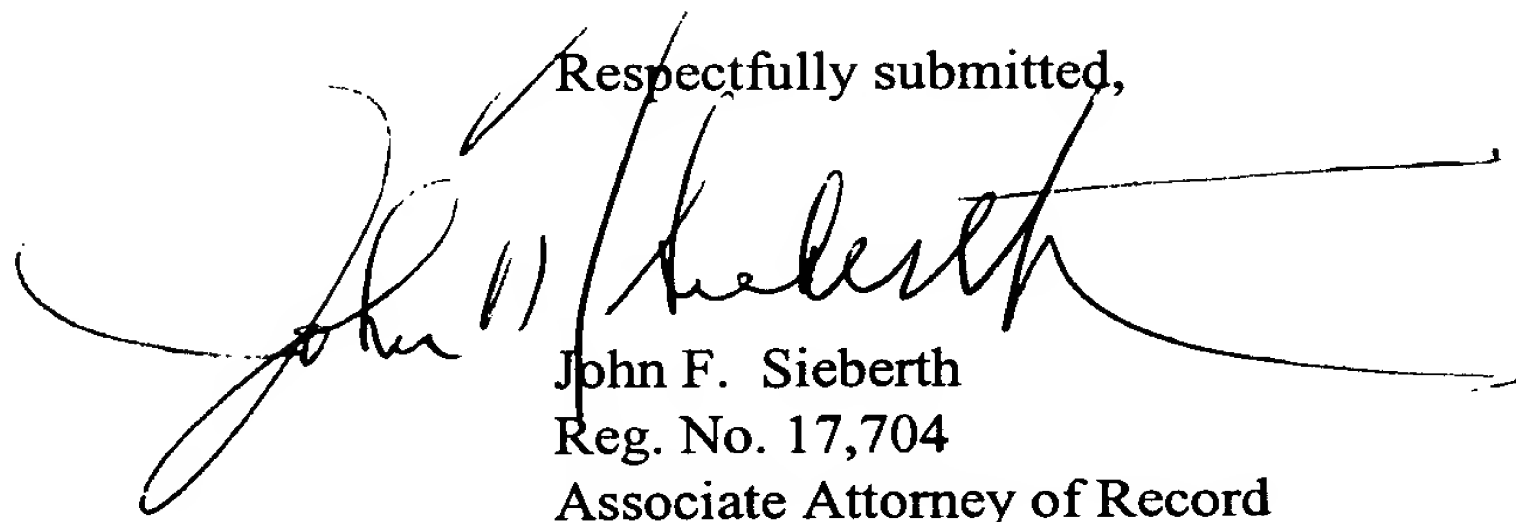
For the reasons given above, it is believed that the claims in the case are in condition for Allowance. Notification to this effect would therefore be appreciated. If however, any matters remain requiring further consideration, the Examiner is respectfully requested to telephone the undersigned so that such matters can be discussed, and if possible, promptly resolved.

The amendments to the specification merely update the information as regards commonly-owned copending patent applications referred to therein.

The attached pages headed "Marked-up Pages Showing Changes Made" are provided for the Examiner's convenience.

Please continue to address all correspondence in this Application to Mr. Philip M. Pippenger at the address of record.

Respectfully submitted,



John F. Sieberth
Reg. No. 17,704
Associate Attorney of Record

Telephone: 225-291-4600
Facsimile: 225-291-4606

CERTIFICATE OF MAILING

I hereby certify that in accordance with standard business practice, this paper (along with any referred to as being attached or enclosed) is to be deposited on the date shown below with the United States Postal Service as first class mail in an envelope addressed to: Commissioner for Patents, Box RCE, Washington, D.C. 20231.

May 3, 2009
Date

Veronica S. Kesler

MARKED-UP PAGES SHOWING CHANGES MADE

132. (New) A process for the N-halogenation of a compound having in the molecule at least one halogenatable amido or imido functional group, which process comprises concurrently, or substantially concurrently, feeding into a reaction zone:

- A) separate feeds of (i) an aqueous solution or slurry formed from an inorganic base and a compound having in the molecule at least one halogenatable amido or imido nitrogen atom, and (ii) a brominating agent and/or a chlorinating agent; or
- B) at least three separate feeds, one of which is a brominating agent and/or a chlorinating agent, and at least two other feeds, at least one of which is selected from (a) and (b); and at least one of which is selected from (c) and (d), wherein
 - (a) is an aqueous solution or slurry formed from an inorganic base,
 - (b) is an aqueous solution or slurry formed from an inorganic base and a compound having in the molecule at least one halogenatable amido or imido nitrogen atom,
 - (c) is a compound having in the molecule at least one halogenatable amido or imido nitrogen atom, and
 - (d) is an aqueous solution or slurry formed from a compound having in the molecule at least one halogenatable amido or imido nitrogen atom;

in proportions such that at least one said amido or imido nitrogen atom becomes substituted by a bromine or chlorine atom, thereby continuously or substantially continuously forming product which precipitates in the liquid phase of an aqueous reaction mixture during all or substantially all of the time said concurrent feeding is occurring, and such that the pH of said liquid phase is continuously or substantially continuously maintained in the range of about 5.5 to about 8.5 during all or substantially all of the time said concurrent feeding is occurring.

2. (Amended) A process of Claim 132 [1] wherein said pH is in the range of about 6.5 to about 8.5, and wherein the brominating agent and/or chlorinating agent used is bromine, bromine chloride, or bromine and chlorine.

3. (Amended) A process of Claim 132 [1] wherein at least said compound having in the molecule at least one N-halogenatable amido or imido nitrogen atom and said inorganic base [(a) and (b)] are fed in the form of a single preformed aqueous solution or slurry.

4. (Amended) A process of Claim 132 [1] wherein at least said compound having in the molecule at least one N-halogenatable amido or imido nitrogen atom [(a)] is fed in the form of a separate preformed aqueous solution or slurry, and wherein at least said inorganic base [(b)] is fed in the form of a separate preformed aqueous solution or slurry.

5. (Amended) A process of Claim 132 [1] wherein when starting up said process, said feeding is initiated into a reactor containing (i) a solids-containing heel of a reaction mixture from a prior reaction in which the product to be formed had been formed, or (ii) a solids-free mother liquor of a reaction mixture from a prior reaction in which the product to be formed had been formed.

6. (Amended) A process of Claim 132 [1] wherein said feeding is initially to a mixing device which produces an effluent stream formed from:

- A) said compound having in the molecule at least one N-halogenatable amido or imido nitrogen atom and said inorganic base; or
- B) (i) said compound having in the molecule at least one N-halogenatable amido or imido nitrogen atom and water, (ii) said inorganic base and water, or (iii) said brominating agent and/or chlorinating agent and water; or
- C) said compound having in the molecule at least one N-halogenatable amido or imido nitrogen atom, said inorganic base, and water;

[(a) and (b), or (a) and (d), (b) and (d), or (c) and (d), or (a), (b), and (d),] and wherein the effluent stream is fed into a reaction vessel containing a larger volume of the aqueous reaction mixture; wherein said stream is subjected to dilution in the aqueous reaction mixture before the temperature of said effluent stream exceeds about 90°C; and wherein the temperature of the aqueous reaction mixture is maintained in the range of about 0 to about 90°C during all or substantially all of the time said feeding is occurring.

9. (Amended) A process of Claim 132 [1] wherein said aqueous reaction mixture is at one or more temperatures in the range of about 0 to about 90°C.

10. (Amended) A process of Claim 132[1] wherein said compound having in the molecule at least one N-halogenatable amido or imido nitrogen atom [(a)] is a 5,5-dialkylhydantoin in which each alkyl group has, independently, up to about three carbon atoms; wherein said inorganic base [(b)] is a basic salt or oxide of a water-soluble alkali metal or an alkaline earth metal; wherein the amount of such base is the stoichiometric quantity, or is substantially the stoichiometric quantity, theoretically required to deprotonate at least one nitrogen atom of said hydantoin; wherein said brominating agent and/or chlorinating agent [(c)] is (i) bromine, (ii) chlorine, (iii) bromine chloride, (iv) an alkali metal bromide or aqueous solution thereof, or an alkaline earth metal bromide or aqueous solution thereof, and chlorine, or hypochlorite salt or aqueous hypochlorite solution in amounts sufficient to generate bromine *in situ*, or (v) a combination of any two or more of (i), (ii), (iii), and (iv); wherein at least all or such portion of said brominating agent and/or chlorinating agent [(c)] that is in the vapor state, if any, is fed subsurface to the liquid phase of the aqueous reaction mixture; wherein the temperature of the aqueous reaction mixture is continuously or substantially continuously in the range of from about 30 to about 90°C during all or substantially all of the time said feeding is occurring; and wherein the proportions of the feeds are such that the total amount of said brominating agent and/or chlorinating agent [(c)] being

18. (Amended) A process of Claim 132 [13] wherein said aqueous reaction mixture is at one or more temperatures in the range of about 0 to about 90°C, and wherein if said brominating agent and/or chlorinating agent is in the form of a vapor, said vapor is fed subsurface to the liquid phase of the reaction mixture.

19. (Amended) A process of any of Claims 132, 14, 15, or 16 [13-16] wherein said process is conducted in a continuous mode in which, under steady state conditions, said feed(s) are maintained such that the ratio of (i) the volume of said reaction mixture in liters to (ii) the moles of said compound having in the molecule at least one halogenatable amido or imido nitrogen atom being fed to the reaction mixture per minute is in the range of about 10 to about 100 liters per mole per minute.

20. (Amended) A process of any of Claims 132, 14, 15, or 16 [13-16] wherein said process is conducted in a batch mode in at least one reactor and wherein, until the volume of the reaction mixture reaches 50 percent of the total volume of the reactor(s), the feeds to said reaction mixture are maintained such that the ratio of (i) the volume of said reaction mixture in liters to (ii) the moles of said N-halogenatable compound [of (a)] being fed to the reaction mixture per minute is in the range of about 10 to about 100 liters per mole per minute; and wherein, when the volume of the reaction mixture is 50 percent or more of the total volume of the reactor(s), the feeds to said reaction mixture are maintained such that the ratio of (i) the volume of said reaction mixture in liters to (ii) the moles of N-halogenatable compound being fed to the reaction mixture per minute is in the range of about 30 to about 60 liters per mole per minute.

21. (Amended) A process of Claim 132 [13] wherein said pH is in the range of about 6.8 to about 7.2.

23. (Amended) A process of Claim 132 [13] wherein the proportions of water, inorganic base, and said compound being fed are such that:

- A) where the inorganic base has a monovalent cation, there are from about 0.5 to about 2.5 moles of halogenatable amido or imido nitrogen atoms and from about 0.5 to about 2.5 moles of the base, per liter of water; and
- B) where the base has a divalent cation, there are about 0.5 to about 2.5 moles of halogenatable amido or imido nitrogen atoms and from about 0.25 to about 1.25 moles of the base, per liter of water.

24. (Amended) A process of Claim 132 [13] wherein the proportions of water, inorganic base, and said compound being fed are such that:

- A) where the inorganic base has a monovalent cation, there are from about 1.0 to about 1.5 moles of halogenatable amido or imido nitrogen atoms and from about 1.0 to about 1.5 moles of the base, per liter of water; and
- B) where the base has a divalent cation, there are about 1.0 to about 1.5 moles of halogenatable amido or imido nitrogen atoms and from about 0.5 to about 0.75 moles of the base, per liter of water.

25. (Amended) A process of Claim 132 [13] wherein the process is conducted in a batch mode.

27. (Amended) A process of Claim 132 [13] wherein the process is conducted in a continuous mode; wherein the temperature of the aqueous reaction mixture is in the range of about 20 to about 90 °C; and wherein said inorganic base and said compound having in the molecule at least one halogenatable amido or imido nitrogen atom are fed either as separate solutions or slurries in water or as a single solution or slurry in water.

28. (Amended) A process of Claim 27 wherein during steady-state operation, precipitate is continuously being formed that (1) [(a)] has a purity of at least about 97%, and (2) [(b)] is formed in a continuous or substantially continuous yield of at least about 85%

based on the amount of the compound having at least one halogenatable amido or imido nitrogen atom being fed to the reactor.

29. (Amended) A process of Claim 132 [13] wherein said compound having at least one amido or imido functional group in the molecule is a hydantoin in which each of the two substituents in the 5-position is, independently, a hydrogen atom or a hydrocarbyl group.

33. (Amended) A process of Claim 30 wherein said process is conducted in batch mode in at least one reactor and wherein, until the volume of the reaction mixture reaches 50 percent of the total volume of the reactor(s), the feeds to said reaction mixture are maintained such that the ratio of (i) the volume of said reaction mixture in liters to (ii) the moles of said compound having in the molecule at least one N-halogenatable amido or imido nitrogen atom [of (a)] being fed to the reaction mixture per minute is in the range of about 10 to about 100 liters per mole per minute; and wherein, when the volume of the reaction mixture is 50 percent or more of the total volume of the reactor(s), the feeds to said reaction mixture are maintained such that the ratio of (i) the volume of said reaction mixture in liters to (ii) the moles of said hydantoin being fed to the reaction mixture per minute is in the range of about 30 to about 60 liters per mole per minute.

35. (Amended) A process of Claim 132 [13] wherein said compound having in the molecule at least one halogenatable amido or imido nitrogen atom is a 5,5-dialkylhydantoin in which each alkyl group has, independently, up to about six carbon atoms; wherein said inorganic base is a basic salt or oxide of an alkali metal or an alkaline earth metal; wherein the amount of such base is the stoichiometric quantity, or is substantially the stoichiometric quantity, theoretically required to deprotonate at least one nitrogen atom of said hydantoin; wherein said brominating agent and/or chlorinating agent is (i) bromine, (ii) chlorine, (iii) bromine chloride, (iv) an alkali metal bromide or aqueous solution thereof, or an alkaline earth metal bromide or aqueous solution thereof, and chlorine, or hypochlorite salt or aqueous hypochlorite solution in amounts sufficient to generate bromine *in situ*, or (v) a

combination of any two or more of (i), (ii), (iii), and (iv); wherein at least all or such portion of brominating agent and/or chlorinating agent that is in the vapor state, if any, is fed subsurface to the liquid phase of the aqueous reaction mixture; wherein the temperature of the aqueous reaction mixture is continuously or substantially continuously maintained in the range of from about 20 to about 80°C during all or substantially all of the time said feeding is occurring; and wherein said process is conducted in a continuous mode in which, under steady state conditions, the feeds to said reaction mixture are maintained such that the ratio of (i) the volume of said reaction mixture in liters to (ii) the moles of said 5,5-dialkylhydantoin being fed to the reaction mixture per minute is in the range of about 30 to about 60 liters per mole per minute.

36. (Amended) A process of Claim 132 [13] wherein said compound having in the molecule at least one halogenatable amido or imido nitrogen atom is a 5,5-dialkylhydantoin in which each alkyl group has, independently, up to about six carbon atoms; wherein said inorganic base is a basic salt or oxide of an alkali metal or an alkaline earth metal; wherein the amount of such base is the stoichiometric quantity, or is substantially the stoichiometric quantity, theoretically required to deprotonate at least one nitrogen atom of said hydantoin; wherein said brominating agent and/or chlorinating agent is (i) bromine, (ii) chlorine, (iii) bromine chloride, (iv) an alkali metal bromide or an alkaline earth metal bromide, and chlorine, a hypochlorite salt, or an aqueous hypochlorite solution in amounts sufficient to generate bromine *in situ*, or (v) a combination of any two or more of (i), (ii), (iii), and (iv); wherein at least all or such portion of said brominating agent and/or chlorinating agent that is in the vapor state, if any, is fed subsurface to the liquid phase of the aqueous reaction mixture; wherein the temperature of said aqueous reaction mixture is continuously or substantially continuously maintained in the range of from about 20 to about 80°C during all or substantially all of the time said feeding is occurring; wherein said process is conducted in a batch mode in at least one reactor; wherein, until the volume of the reaction mixture reaches 50 percent of the total volume of the reactor(s), the feeds to said reaction mixture are maintained such that the ratio of (i) the volume of said reaction mixture in liters to (ii) the

moles of said 5,5-dialkylhydantoin being fed to the reaction mixture per minute is in the range of about 20 to about 80 liters per mole per minute; and wherein, when the volume of the reaction mixture is 50 percent or more of the total volume of the reactor(s), the feeds to said reaction mixture are maintained such that the ratio of (i) the volume of said reaction mixture in liters to (ii) the moles of said 5,5-dialkylhydantoin being fed to the reaction mixture per minute is in the range of about 30 to about 60 liters per mole per minute.

In the Specification:

Page 1, please replace the paragraph under the heading "REFERENCE TO OTHER APPLICATIONS" with the following paragraph:

Commonly-owned copending Application No. 09/484,687, [Case SU-7153], filed January 18, 2000, [contemporaneously herewith], by us and one of our colleagues, describes and claims 1,3-dibromo-5,5-dimethylhydantoin particulate solids producible by the processes of this Application, such solids having unprecedented enhanced properties, and compacted articles made from such particulate solids without use of a binder. Commonly-owned copending Application No. 09/487,816, [Case SU-7154], filed January 18, 2000, [contemporaneously herewith], by one of us and one of our colleagues, relates in part to converting 1,3-dihalo-5,5-dimethylhydantoins into compacted articles using novel binders. Commonly-owned copending Application No. 09/484,938, [Case SU-7155], filed January 18, 2000, [contemporaneously herewith], by some of our colleagues, describes and claims methods for effecting efficacious microbiological control utilizing 1,3-dibromo-5,5-dimethylhydantoin in novel compacted or non-compacted forms. Commonly-owned copending Application No. 09/484,891, [Case SU-7161], filed January 18, 2000, [contemporaneously herewith], by one of our colleagues relates to the compacting of 1,3-dihalo-5,5-dimethylhydantoins other than 1,3-dibromo-5,5-dimethylhydantoin without use of binders, and to the novel compacted forms so produced. Commonly-owned copending Application No. 09/483,896, [Case SU-7162], January 18, 2000, filed [contemporaneously herewith], by one of us and one of our colleagues relates to the

granulation of small average particle size 1,3-dibromo-5,5-dimethylhydantoin and also to the compaction of such granulated products to form larger-sized articles.

Please amend the second paragraph beginning at Page 30, line 14 through Page 31, line 2 to read as follows:

Because this invention enables the direct production of 1,3-dibromo-5,5-dimethylhydantoin reaction products in which the recovered 1,3-dibromo-5,5-dimethylhydantoin particulate solids have an average particle size of at least 175 microns, several very substantial advances in the art are made possible. For example, it has been discovered that 1,3-dibromo-5,5-dimethylhydantoin particulate solids having average particle sizes above 175 microns:

- a) are far easier to handle because of their much lower dusting tendencies;
- b) have flow properties through pipes and conduits and from hoppers that are far superior;
- c) could be pressure compacted into shape-retentive tablets without use of a binder and without breakage occurring, whereas samples of commercially-available 1,3-dibromo-5,5-dimethylhydantoin particulate solids from several different sources could not be converted into tablets in the same manner without breakage occurring.

These and related discoveries are described in detail in commonly-owned copending Application No. 09/484,687 [--[Case SU-7153]__] referred to above.

Andalusia

words, phrases, or clauses) along or together with; in addition to; besides; also; moreover. 2. added to; plus; 2 and 2 are 4. 3. He read for an hour and went to bed. 4. also, at the same time: to sleep and dream. 5. then again; repeatedly. He coughed and coughed. 6. (used to imply simultaneous qualities in things having the same name): Bargains and bargains, so watch out. 7. (used to introduce a sentence, implying continuation) also; and then it happened. 8. Informal. (used before two finite verbs): Try and do it. Call and see if you can get home yet. 9. (used to introduce a consequence or conditional result): He felt sick and decided to lie down for a while. Say one more word about it and I'll scream. 10. but; on the contrary: He tried to run five miles and fell out. They said they were about to leave and then didn't. They said they were about to leave and then didn't. 11. (used to connect alternatives): He felt that he was being forced to choose between his career and his family. 12. (used to introduce a comment on the preceding clause): They don't like each other and with good reason. 13. Archaic. if and you are, or cetera: We discussed traveling, sightseeing, and so on. 14. and so forth, and the like; and others. Cf. *et cetera*. We discussed traveling, sightseeing, and so on. 15. and so on, and more things or others of a kind; and the like: It was a summer filled with parties, picnics, and so on. 16. an added condition, stipulation, detail, or particular: He accepted the job, no matter how much about it. 17. conjunction (def. 5b). [Def. 100; ME, OE *and*, Gnd; c. OS, OHG *ant*, OFris, Goth *and*, Lat *et*; akin to *and* and *but*, and to a lesser extent on *and* and *but*. Both *AND* and *BUT*, and to a lesser extent on *and* and *but*, are common as transitional words at the beginning of sentences in all types of speech and writing: General Jackson thought the attack would come after darkness. And he was right. Any objection to this practice probably stems from the overuse of such sentences by inexperienced writers. When one of these words begins a sentence or an independent clause within a sentence, it is not followed by a comma unless the comma is needed for a pair setting off a parenthetical element that follows: John is popular, and he seems to be well adjusted. But, appearances to the contrary, he is often depressed. See also *and/or*, *et cetera*, *try*.



Anda-lu-sia (an'dl ōō'zhā, -shē ə), *n.* 1. Spanish, *Andalucía* (an'dā lōō thē'ā, -shē'ā), a region in S Spain, bordering on the Atlantic Ocean and the Mediterranean Sea. 33,712 sq. mi. (87,314 sq. km). 2. a city in S Alabama. 10,415. —*Anda-lu-sian*, *adj.*, *n.*

Anda-lu-site (an'dl ōō'sīt), *n.* Mineral. an orthorhombic form of aluminum silicate, Al_2SiO_5 , found in schistose rocks. [1830-40; named after ANDALUSIA, where it was first found; see -ite']

Anda-man (an'də mən), *adj.* 1. Also, *Andamanese*. of or pertaining to the Andaman Islands, the Andamanese people, or their language. —*n.* 2. Andamanese (def. 1).

Andaman and Nicobar Is/lands (nik'ə bār', nīk'ə bār'), a union territory of India, comprising the Andaman and Nicobar island groups in the E part of the Bay of Bengal, SW of Burma. 188,254; 3143 sq. mi. (8140 sq. km). Cap.: Port Blair.

Anda-man-ese (an'də mən ēz', -nēz'), *n.*, *pl.* -ese, *adj.* —*n.* 1. Also, *Andaman*. Also called *Andaman Islander*. a member of a physically distinctive people that comprise the indigenous population of the Andaman Islands. 2. the language of the Andamanese, of uncertain genetic affiliation. —*adj.* 3. Andaman (def. 1). [1860-65; ANDAMAN + -ese]

Andaman Is/lands, a group of islands of India in the E part of the Bay of Bengal, W of the Malay Peninsula, part of Andaman and Nicobar Islands. 157,821; 2506 sq. mi. (6496 sq. km).

Andaman Sea, a part of the Bay of Bengal, E of the Andaman and Nicobar Islands. 300,000 sq. mi. (777,000 sq. km).

Anda-men-to (an'də mən'tō; It. an'dā men'tō), *n.*, *pl.* -tos, *It. -tā*. Music. 1. an extended fugue subject. 2. an episode in a fugue. [*<* It. equiv. to *anda(re)* to walk (see ANDANTE) + *-mento* -MENT]

Andan-te (än dän'tā, an dän'tē; It. an dän'te), *adj.*, *adv.*, *n.*, *pl.* -tes. Music. —*adj.*, *adv.* 1. moderately slow and even. —*n.* 2. an andante movement or piece. [1735-45; *<* It. lit., walking, *pp.* of *andare* to walk, go (see ANDARE); etym. disputed, but often alleged: *<* VL *ambulare*, deriv. of *L ambitus* circular motion, roundabout journey (see AMBARE); perh., alternatively, early L borrowing *<* Gaulish **andā-*, akin to *L pandere* to spread (hence, stride); cf. *passus* step, pace (action *n.* **pand-tu-*), equiv. to *Oir* footprint, track]

Andan-ti-no (än dän'tē'nō, an dän'-; It. an'dän tē'nō), *adj.*, *adv.*, *n.*, *pl.* -nos, *It. -nī* (-nē). Music. —*adj.*, *adv.* 1. slightly faster than andante. —*n.* 2. an andantino movement or piece. [1810-20; *<* It. equiv. to *andan(te)* ANDANTE + *-ino* dim. suffix]

AND/circuit (and), Computers. a circuit that is energized only when all of its inputs are energized.

An-de-an (an dē'en, an'dē-), *adj.* of or like the Andes. [1830-40; ANDES + -AN]

Ande'an con'dor. See under *condor* (def. 1).

Ande'an deer', huemul.

An-der-lecht (än'das lekht'), *n.* a city in central Belgium, near Brussels. 103,796.

An-der-sen (an'dər sən), *n.* Hans Christian (hanz), 1805-75, Danish author, esp. of fairy tales.

An-der-sen Nex-ō (ä'nər sən nīk'ō), See Nexō, Martin Andersen.

An-der-son (an'dər sən), *n.* 1. Carl David, 1905-91, U.S. physicist: discoverer of the positron; Nobel prize 1936. 2. Dame Judith, born 1898, Australian actress in the U.S. 3. Marian, 1902-93, U.S. contralto. 4. Maxwell, 1888-1959, U.S. dramatist. 5. Philip Warren, born 1923, U.S. physicist: developer of solid-state circuitry; Nobel prize 1977. 6. Sherwood, 1876-1941, U.S. novelist and short-story writer. 7. a city in central Indiana. 64,695. 8. a city in NW South Carolina. 27,313.

An-der-son-ville (an'dər sən vil'), *n.* a village in SW Georgia: site of a Confederate military prison. 267.

Andes (an'dēz), *n.* (used with a plural *v.*) a mountain range in W South America, extending ab. 4500 mi. (7250 km) from N Colombia and Venezuela S to Cape Horn. Highest peak, Aconcagua, 22,834 ft. (6960 m).

an-de-sine (an'də zēn'), *n.* a mineral, intermediate in the plagioclase feldspar group, having a play of colors and usually found as crystals in igneous rocks. [1860-65; named after ANDES; see -ine']

an-des-ite (an'də zit'), *n.* a dark-colored volcanic rock composed essentially of plagioclase feldspar and one or more mafic minerals, as hornblende or biotite. [1840-50; named after ANDES; see -ite'] —**an-de-sitic** (an'də zit'ik), *adj.*

An/des light'ning, an electrical discharge of the corona type, occurring over mountains when the atmosphere is electrically disturbed. Also called *An/des glow*, *An/des lights*.

An-dhra Pradesh (än'drə prē dāsh'), a state in SE India, formed from portions of Madras and Hyderabad states 1956. 48,630,000; 105,963 sq. mi. (274,444 sq. km). Cap.: Hyderabad.

an-dis-mo (än dyä'mō), *interj.* Italian. let's go; hurry up.

An-die (an'dē), *n.* a male or female given name.

An-di-ki-thi-ra (an'di ki thēr'e; Gk. än'dē kē'thē rä), *n.* Antikythera.

and-i-ron (and'vērən), *n.* one of a pair of metal stands, usually of iron or brass, for holding logs in a fireplace. [1250-1300; ME *aundy(r)*, AF *aundyre*, with the 2d syll. taken as ME *ire*, *iren* *iron* *<* OF *andier*, allegedly *<* Gaulish **anderos* young animal (through known use of animals' heads as decorations on andirons), though supposed relation between this word and Middle Welsh *anneir*, Breton *anneir* heifer, OIr *ainder* young woman, poses serious phonetic problems]

—**Regional Variation**. See *dog iron*, *firelog*.



An-di-zhan (än'di zhān'; Russ. un dyi zhān'), *n.* a city in E Uzbekistan, SE of Tashkent. 230,000.

and/or (and'ōr'), *conj.* (used to imply that either or both of the things mentioned may be affected or involved): insurance covering fire and/or wind damage.

—**Usage**. The combination *AND/OR* is used primarily in business and legal writing: All dwellings and/or other structures on the property are included in the contract. Because of these business and legal associations, some object to the use of this combination in general writing, where it occasionally occurs: She spends much of her leisure time entertaining and/or traveling. In such writing, either *AND* or *OR* is usually adequate. If a greater distinction is needed, another phrasing is available: Would you like cream or sugar, or both?

an-do-ro-be (an'də rō'be), *n.* carapa. [*<* Pg *andiroba* *<* Tupi *nhandiroba*]



An-dor-ra (an dōr'e, -dōr'e; Sp. än dōr'rā), *n.* 1. a republic in the E Pyrenees between France and Spain, under the joint suzerainty of France and the Spanish Bishop of Urgel. 26,558; 191 sq. mi. (495 sq. km). 2. Also called *An-dor-ra la Ve-lla* (Catalan. än dōr'rā lā ve'llä), a city in and the capital of this republic. 7926. French, *An-dorre* (än dōr'). —**An-dor-ran**, *adj.*, *n.*

And-over (an'dō ver, -də-), *n.* a city in NE Massachusetts. 26,370.

andr-, var. of *andro-* before a vowel: *android*.

An-dra-da e Sil-va (än drä'dā e sēl'vā), Jo-sé Bo-ni-fa-cio de (zhō zō' bō'nē fā'syōō di), 1763-1838, Brazilian statesman and scientist: architect of Brazilian independence.

an-dra-dite (än'drə dīt'), *n.* a mineral, calcium-iron garnet, $Ca_2Fe_2Si_2O_{10}$, occurring in brown, green, or black crystals. [1830-40; named after J. B. de ANDRADA e SILVA; see -ite']

an-dra-go-gy (än'drə gō'jō, -gōj'ē), *n.* the methods or techniques used to teach adults. [ANDR- + (PED)AGOGY; see -AGOGUE, -Y']

An-drás-sy (än dras'ē; Hung. on'drā shē), *n.* 1. Count Julius, 1823-90, Hungarian statesman. 2. his son, Count Julius (Gyula), 1860-1929, Hungarian statesman.

An-dré (än'drā or, for 1, an'drē; for 2 also Fr. än'drā'), *n.* 1. John, 1751-80, British major hanged as a spy by the Americans in the Revolutionary War: plotted the betrayal of West Point with Benedict Arnold. 2. a male given name, French form of *Andrew*.

An-dre-a (än'drē ə, än'-, än'drā'ə), *n.* a male or female given name, Latinized form of *Andrew*.

An-dre-a del Sar-to (än drā'ə del sār'tō; It. än'drē'ā del sār'tō), 1. (Andrea Domenico d'Annolo di Francesco) 1486-1531, Italian painter. 2. (italics) a dramatic monologue (1855) by Robert Browning.

An-dre-a-nof Is/lands (än'drē an'ōf, -ōf, än'drē ā-nōf, -nōf; Russ. un dayi yā'nōf), a group of islands in the W part of the Aleutian Islands. 1432 sq. mi. (3710 sq. km).

An-dret-ti (än dret'ē), *n.* Mario (Gabriel), born 1940, U.S. racing-car driver.

An-drew (än'drōō), *n.* 1. one of the 12 apostles of Jesus. Mark 3:18; John 1:40-42. 2. a male given name: from a Greek word meaning "manly."

An-drewes (än'drōōz), *n.* Lancelot, 1555-1626, English theologian: one of the translators of the Authorized Version of the Bible.

An/drew of Crete, A.D. c.650-730, Greek poet and Orthodox archbishop of Crete.

Andrews (än'drōōz), *n.* 1. Charles McLean (ma klān'), 1863-1943, U.S. historian and author. 2. Frank Maxwell, 1884-1943, U.S. Air Force general. 3. Roy Chapman, 1884-1960, U.S. naturalist, explorer, and author. 4. a city in NW Texas. 11,061.

An-dre-yev (än drē'ef; Russ. un daye'yēf), *n.* Le-o-nid Ni-ko-lai-ovich (lē'ō nīd nīk'ō lē'ō vīch; Russ. lyi u-nyēf' nīy ku lā'yī vīch), 1871-1919, Russian novelist, short-story writer, and playwright.

An-drić (än'drič), *n.* I-vo (ē'vō), 1892-1975, Yugoslavian poet, novelist, and short-story writer: Nobel prize 1961.

andro-, a combining form meaning "male," used in the formation of compound words: *androsterone*. Also, *andr-* [*<* Gk *andrō(s)*, gen. of *andrōs* man; akin to *Skt nar-*, Albanian *njeri* person, *L Nero* Nero]

an-dro-cent-ric (än'drə sən'trik), *adj.* centered on, emphasizing, or dominated by males or masculine interests: an *androcentric* society; an *androcentric* religion. [1900-05; ANDRO- + -CENTRIC, on the model of ETHNOCENTRIC] —**an-dro-cent-rism**, *n.* —**an-dro-cent-rist**, *n.*

An-dro-cles (än'drə klēz'), *n.* Rom. Legend. a slave who was spared in the arena by a lion from whose foot he had long before extracted a thorn. Also, *An-dro-cles* (än'drə klēs).

An/drocles and the Li/on, a comedy (1913) by G. B. Shaw.

an-dro-clin-i-um (än'drə klin'ē em), *n.*, *pl.* -clīn-i-a (-klin'ē ə). Bot. clinandrium. [*<* NL, equiv. to *andro-* ANDRO- + *-clinium* *<* Gk *klinion*, dim. of *klinē* bed; see -IUM]

an-dro-co-ni-um (än'drə kō'nē em), *n.*, *pl.* -nī-a (-nē ə). a scale on the forewing of certain male butterflies from which an odor attractive to females is emitted. [1875-80; *<* NL, equiv. to *andro-* ANDRO- + *-conium* *<* Gk *kónion*, neut. of *kónios* dusty (*kóni(s)* dust + *-os* *adj.* suffix)]

an-dro-cra-cy (än drok'rē sē), *n.* social and political rule by men. [ANDRO- + -CRACY] —**an-dro-crat-ic** (än'drə krat'ik), *adj.*

an-dro-di-oe-cious (än'drō di'ēshēs), *adj.* Bot. having staminate and monoclinous flowers on separate plants of the same species. [1875-80; ANDRO- + DIOECIOUS] —**an-dro-di-oe-cism** (än'drō di'ē'siz em), *n.*

an-dro-e-cl-um (än drē'shē em), *n.*, *pl.* -cl-ē (-shē ə). Bot. the stamens of a flower collectively. [1830-40; *<* NL *<* Gk *andr-* ANDR- + *oiklon*, dim. of *oikos* house] —**an-dro-e-clal** (än drē'shel), *adj.*

an-dro-gen (än'drə jən, -jēn'), *n.* Biochem. any substance, as testosterone or androsterone, that promotes male characteristics. [1935-40; ANDRO- + -GEN] —**an-dro-gen-ic** (än'drə jēn'ik), *adj.*

an-dro-g-e-nous (än droj'ē nēs), *adj.* Biol. pertaining to the production of or tending to produce male offspring. [1750-60; ANDRO- + -GENOUS]

An-dro-g-e-us (än droj'ē əs, -yōōs), *n.* Class. Myth. a son of Minos and Pasiphaë who fell victim to Athenian King Aegeus: in revenge, Minos waged war on the Athenians and forced them to send a tribute of seven

anchorman anemo-

retire : *ana-*, back + *khōrein*, to withdraw.] One who has retired into seclusion for religious reasons. —*an'cho-ris'tic* (-rī'tik) *adj.*

an-chor-man (āng'kōr-mān) *n.* 1. One heavily relied on. 2. The usu. strongest member of a team who competes last in a relay race. 3. The narrator or coordinator of a broadcast in which several correspondents give news reports.

an-chor-wom-an (āng'kōr-wōm'an) *n.* A woman who narrates or coordinates a broadcast in which several correspondents give news reports.

an-cho-ry (ān'chō've, ān-chō've) *n., pl.* anchovy or -vies. [Sp. *anchova*.] Any of various small, herringlike marine fishes of the family Engraulidae, several species of which are widely used as food.

an-chy-lo-se (āng'kō-lō'sē, -lōz') *v.* var. of **ANKYLOSE**.

an-chy-lo-sis (āng'kō-lō'sis) *n.* var. of **ANKYLOSIS**.

an-cien ré-gime (ān-syān' rē-zhēm') *n.* [Fr., old regime.] 1. The sociopolitical system existing in France before the Revolution of 1789. 2. A former sociopolitical or other system or mode.

an-cient (ān'shōnt) *adj.* [ME *auncien* < OFr. < VLat. **anteanus* < Lat. *ante*, before.] 1. Very old. 2. Of, existing, or happening in remote times, esp. belonging to the historical period before the fall of the Western Roman Empire (A.D. 476). 3. Antiquated : old-fashioned. 4. Having qualities associated with age, wisdom, or long use : **VENERABLE**. —*n.* 1. A very old person. 2. A person who lived in ancient times. 3. *ancients*. The peoples of the classical nations of antiquity. 4. *ancients*. The ancient Greek and Roman authors. —*an'cient-ly* *adv.* —*an'cient-ness* *n.*

an-cient (ān'shōnt) *n.* [Var. of **ENSIGN**.] Obs. 1. An ensign : **FLAG**. 2. A flag-bearer or lieutenant.

Ancient Chinese *n.* The Chinese language as used until about the 13th cent. A.D.

ancient history *n.* 1. The history of ancient times. 2. *Informal*. Common knowledge, esp. of a recent event that has lost its original novelty or importance.

an-cil-lary (ān'sō-lē're) *adj.* [Lat. *ancillaris*, pertaining to a maid-servant < *ancilla*, maidservant, dim. of *ancula*, fem. of *anculus*, servant.] 1. Subordinate < "For Decas, sculpture was never more than ancillary to his painting" —Herbert Read> 2. Auxiliary < *ancillary* information> —*n., pl.* -les. A servant.

an-ci-pi-tal (ān-sī'pī-tal) *adj.* [< Lat. *anceps*, *ancipit*, two-headed : *ambi*, two + *caput*, head.] Flattened and two-edged < *ancipital* plant stems>

an-con (āng'kōn) *n., pl.* -con-es (āng'kō-nēz) [Lat. *ancon* < Gk. *ankōn*, elbow.] A projecting bracket used in classical architecture to support the upper elements of a cornice : **CONSOLE**.



ancon

-ancy *suff.* [Lat. *-antia*. —see **ANCE**.] **ANCE**.

an-cy-lo-sto-mi-a-sis (ān'sō-lō-stō-mī'ā-sis, āng'kō-lō-) *n.* [NLat. *Ancylostoma*, hookworm genus (Gk. *ankalos*, curved + Gk. *stoma*, mouth) + *-iasis*.] A disease caused by hookworm infestation and characterized by progressive anemia.

and (and, ən, ɪnd when stressed) *conj.* [ME < OE.] 1. Together or along with : as well as. —Used to connect words, phrases, or clauses that have the same grammatical function in a construction. 2. Added to : **PLUS** < Two and two makes four. > 3. As a result : in consequence < They invited me and here I am. > 4. —Used between two verbs, esp. after such verbs as *go*, *come*, or *try* < try and find it> < come and see> 5. Then. —Used to begin a sentence. *usage*: The use of *and* to begin a sentence has a long and respectable history in English < "And it came to pass in those days" —Luke 2:1> 6. *Archaic*. If.

AND (ānd) *n.* [< **AND**.] Computer Sci. A logic operator equivalent to the sentential connective "and."

an-da-lu-si-te (ān'dō-lō'sī'tē) *n.* [Fr. *andalousite*, after *Andalusia*, where it was discovered.] A mineral aluminum silicate, Al_2SiO_5 , usu. found in prisms of various colors.

An-da-man-ese (ān'dō-mā-nēz, -nēs) *n., pl.* *Andamanese*. 1. also *An-da-man* (ān'dō-mān). A member of a Negro people inhabiting the Andaman Islands. 2. The language of the Andamanese, of no known linguistic affiliation. —*An'da-man-ese'* *adj.*

an-dan-te (ān-dān'tā, ān-dān'tē) [Ital., pr. part. of *andare*, to walk, ult. < Lat. *ambulare*.] Mus. —*adv. & adj.* Moderate in tempo : faster than *adagio*, but slower than *allegretto*. —Used as a direction. —*n.* An *andante* movement or passage.

an-dan-ti-no (ān'dān-tē'nō, ān'dān-tē'nō) [Ital. dim. of *andante*,

andante.] Mus. —*adv. & adj.* Slightly faster than *andante* in —Used as a direction. —*n., pl.* -nos. An *andantino* movement or passage.

an-de-si-te (ān'dē-zī'tē) *n.* [C. *Andesit* : *Andes*, *Andes* (where found) + *-ite*, *-ite*.] A fine-grained, gray volcanic rock, mainly *clase* and *feldspar*.

AND gate *n.* Computer Sci. A signal circuit with two or input wires that emits a signal only if all input wires receive ident signals.

and-i-ron (ānd'ī-rōn) *n.* [ME *aundiren*, alteration of OFr. *a*. One of a pair of metal supports for fireplace logs.

and/or (ān'dōr) *conj.* —Used to indicate that either *and* or *or* be used to connect words, phrases, or clauses.

andro- *pref.* var. of **ANDRO-**.

an-dra-dite (ān-drā'dī'tē) *n.* [After José B. de Andrade e Si 1838.] A green to brown or black calcium-iron garnet, $Ca_2Fe_2Si_2O_{12}$.

andro- or **andr-** *pref.* [Gk. < *andr*, *andr*, man.] 1. Male : line < *androgon*> 2. Stamen or anther < *androecium*>

An-dro-cles (ān'drō-klēz) *n.* [Lat. < Gk. *Androkles*.] A leg-Roman slave spared in the arena by a lion that identified him as man who had once removed a thorn from its paw.

an-dro-e-ci-um (ān-drō'shē-ōm, -shōm) *n., pl.* -es (-shē-ō [NLat. < *ANDRO* (O) + Gk. *oikos*, house.] The stamens of a considered as a whole. —*an-dro-e-cial* (-shāl) *adj.*

an-dro-gen (ān'drō-jen) *n.* A steroid hormone that develops maintains masculine characteristics. —*an-dro-gen-ic* (-jēn'ī) *adj.*

an-dro-gene-nize (ān-drō-jē-nīz') *vt.* -mized, -mizing, -mizes *tr.* treat with usu. massive doses of male hormones. —*an-dro-gene-tion* *n.*

an-dro-gene-nous (ān-drō-jē-nōs) *adj.* Of or relating to produce male offspring.

an-dro-gy-nous (ān-drō-jē-nōs) *adj.* [Lat. *androgynus*, herm-dite < Gk. *androgynos* : *andr*, man + *gynē*, woman.] 1. Having female and male characteristics : **HERMAPHRODITE**. 2. Bot. posed of staminate and pistillate flowers. —Used of the flower of certain sedge. 3. Being neither distinctly masculine nor fe-mas in dress, appearance, or behavior. —*an-dro-gy-nous* (-jēn'ī) *n.*

an-droid (ān'drōid) *adj.* Having human features. —*n.* A syn-person created from biological materials.

An-drom-a-che (ān-drōm'ā-kē) *n.* [Lat. < Gk. *Andromakhē* Myth. The faithful wife of Hector, captured by the Greeks at of Troy.

An-drom-e-da (ān-drōm'ē-dō) *n.* [Lat. < Gk. *Andromedē*.] Myth. The daughter of Cepheus and Cassiopeia and wife of Perseus who had rescued her from a sea monster. 2. A constellation Northern Hemisphere. 3. *andromeda*. Any of several hardy of the genus *Andromeda* or related genera.

an-dro-ster-one (ān-drō'stē-rōn) *n.* [*ANDRO* + *STER* (O) -ONE] A male sex hormone, excreted in urine and produced thetically from cholesterol.

-androus *suff.* [NLat. *-andrus* < Gk. *-andros*, having men < *andr*, man.] Having a specified number or kind of stamens : *androus*

-andry *suff.* [< Gk. *andr*, *andr*, man.] 1. The condition of ha-given kind or number of husbands < *monandry*> 2. The con-of having a given kind or number of stamens < *polyandry*>

-ane *suff.* [Alteration of **-ENE**.] A saturated hydrocarbon < *he-an-ec-dot-age* (ān'īk-dō'tij) *n.* Anecdotes as a whole.

an-ec-dot-al (ān'īk-dō'tal) *adj.* Relating to, marked by, or con-ing anecdotes.

an-ec-dote (ān'īk-dō'tē) *n.* [Fr. < Gk. *anekdotos*, unpublished-not + *ekdotos*, published < *ekdidonai*, to publish (ek-, out : nai, to give).] 1. A short, often oral, interesting or humorous = of a real or fictitious incident. 2. *pl.* -dotes or -dotes (-dō'tō), or previously unknown details of history or biography.

* *SYMS*: **ANECDOTE**, **FABLE**, **STORY**, **TALE**, **YARN** *n.* core *ex* : an entertaining, often oral account of a real or fictitious occu- < told anecdotes about their travels>

an-ec-dot-ic (ān'īk-dō'tik) also **an-ec-dot-i-cal** (-kal) 1. Anecdotal. 2. Full of or inclined to telling anecdotes.

an-ec-dot-ist (ān'īk-dō'tist) *n.* One who tells, collects, comp-publishes anecdotes.

an-e-cho-ic (ān'ē-kō'īk) *adj.* Not having or producing echo-a-nele (-nēl) *vt.* a-neled, a-neleing, a-neles. [ME *anelen* : (< OE) + *elen*, to anoint < *ele*, oil < OE < Lat. *oleum*. —*Archaic*. To anoint, esp. during extreme unction.

a-ne-mi-a also **a-næ-mi-a** (ā-nē'mē-ā) *n.* [NLat. < Gk. *anæ-mia*, without + *haima*, blood.] A deficiency in the oxygen- material of the blood, measured in unit volume concentra-hemoglobin, red blood cell volume, and red blood cell num-b-a-ne-mic also **a-næ-mic** (ā-nē'mīk) *adj.* 1. Of, relating to, flicted with anemia. 2. a. Weak and listless. b. Pallid. —*a-ne-cally* *adv.*

anemo- *pref.* [< Gk. *anemos*, wind.] Wind < *anemometer*>

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PAT. NO.	Title
1 6,370,635	<u>Dual ROM microprogrammable microcontroller and universal serial bus microcontroller development system</u>
2 6,370,631	<u>Memory controller including compression/decompression capabilities for improved data access</u>
3 6,370,589	<u>Process for performing at least one test on at least one of the objects of an object-oriented program capable of running in parallel on a computer</u>
4 6,370,587	<u>Network interconnection device</u>
5 6,370,553	<u>Atomic and molecular documents</u>
6 6,370,497	<u>Natural language transformations for propagating hypertext label changes</u>
7 6,370,477	<u>Compression method and apparatus for seismic data</u>
8 6,370,473	<u>Air-fuel ratio control apparatus for multicylinder internal combustion engine</u>
9 6,370,443	<u>Embroidery machine with operation-data storing function and method for controlling same</u>
10 6,370,441	<u>Method and apparatus of correcting design-patterned data, method of electron beam and optical exposure, method of fabricating semiconductor and photomask devices</u>
11 6,370,433	<u>Interrogation of an implantable medical device using broadcast audible sound communication</u>
12 6,370,424	<u>Non-invasive cardiorespiratory monitor with synchronized bioimpedance sensing</u>
13 6,370,382	<u>System and method for reducing wireless telecommunications network resources required to successfully route calls to a wireline network</u>
14 6,370,374	<u>Personal chip card for a mobile radio terminal</u>
15 6,370,362	<u>Slide cover for a communication unit</u>
16 6,370,304	<u>Radiation marking of fiber optic cable components</u>
17 6,370,255	<u>Loudness-controlled processing of acoustic signals</u>
18 6,370,246	<u>Trough for cables and wires</u>
19 6,370,226	<u>Clinical x-ray based apparatus and method with dynamic signalling of an execution feasibility level during entering operational parameter values</u>
20 6,370,220	<u>Method of and device for fluorescent X-ray analysis of a sample</u>
21 6,370,196	<u>Method and apparatus for multiresolution object-oriented motion estimation</u>
22 6,370,184	<u>Correlator receiver</u>
23 6,370,171	<u>Laser machine tool</u>
24 6,370,156	<u>Modulation/demodulation of a pilot carrier, means and method to perform the modulation/demodulation</u>